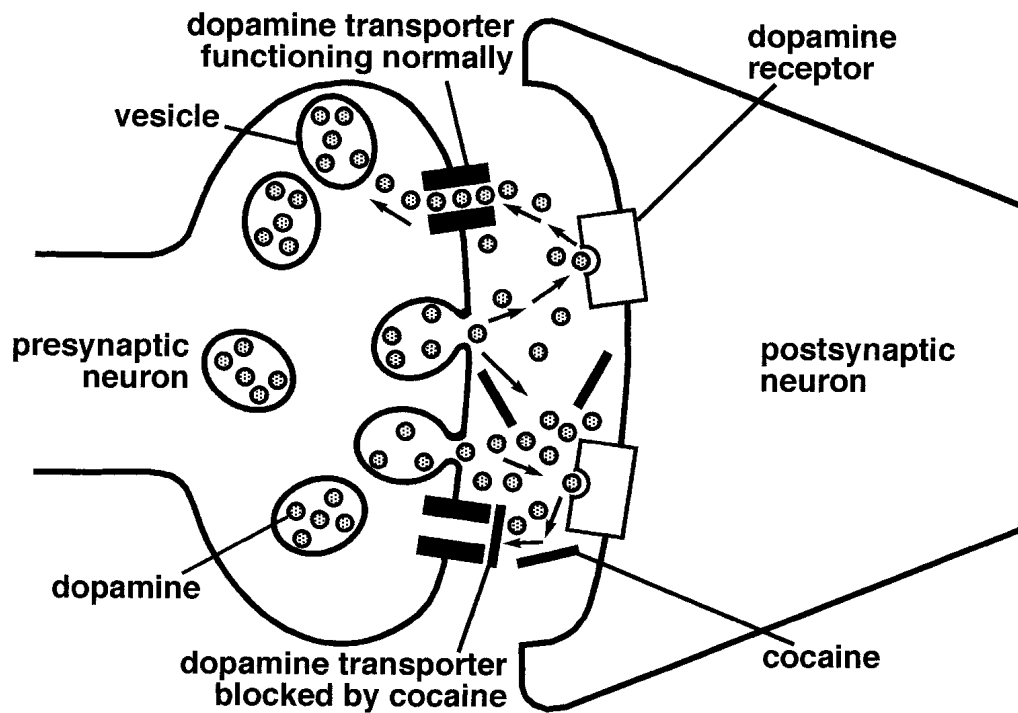
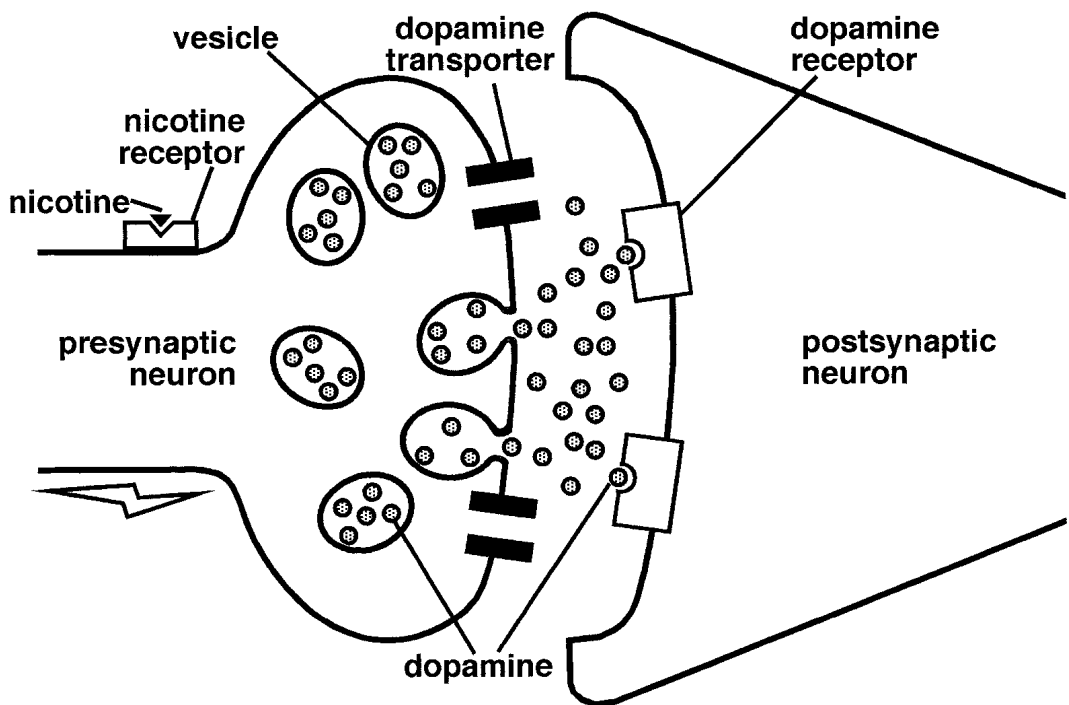
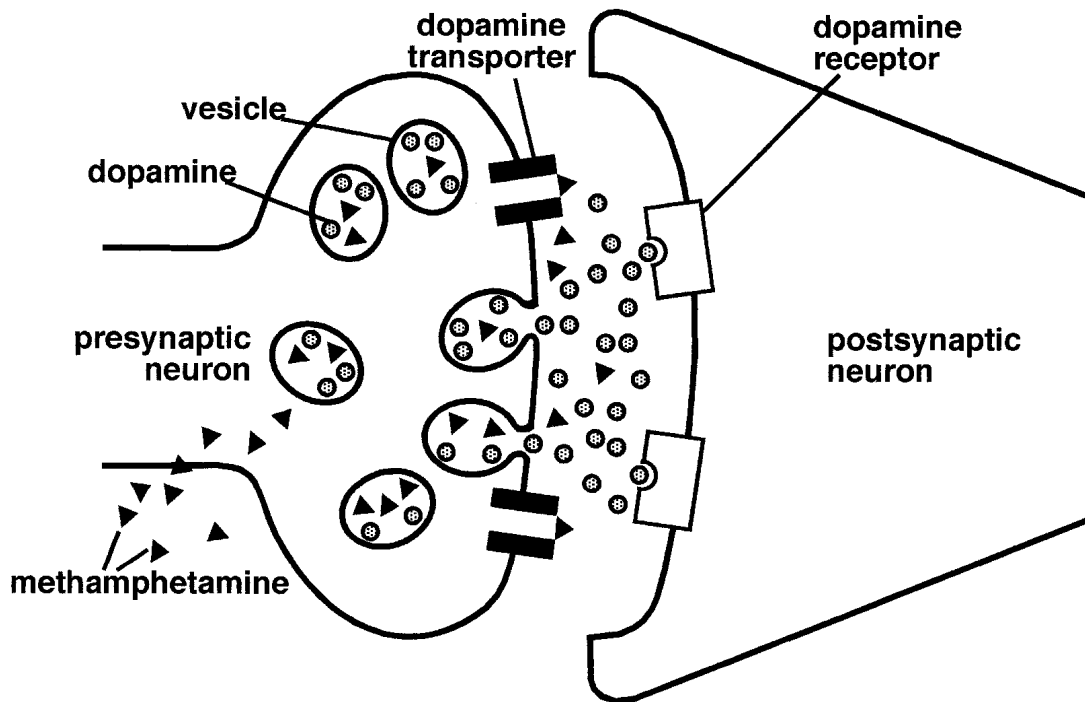


# Cocaine Alters Neurotransmission

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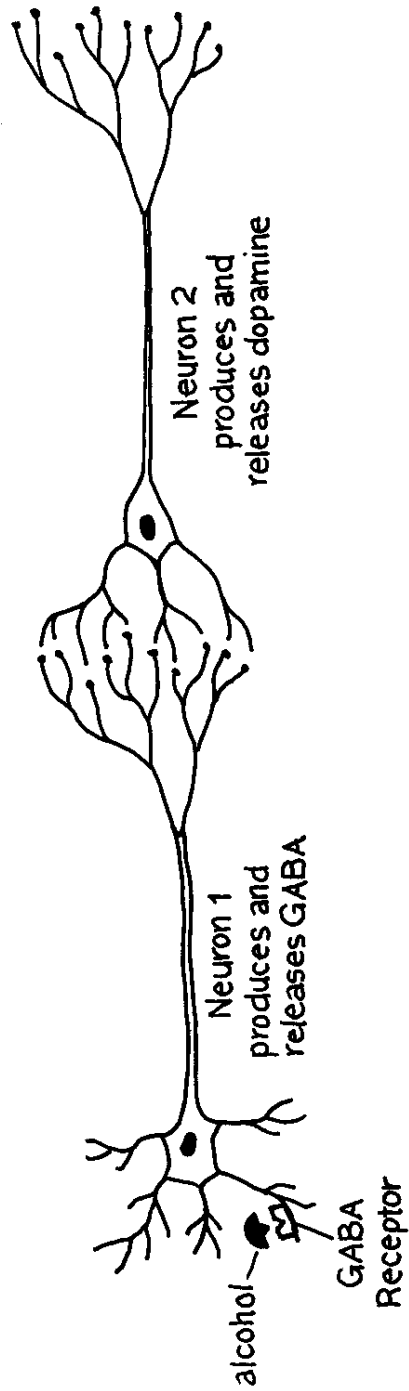


# Methamphetamine and Nicotine Disrupt Neurotransmission



# How Does Alcohol Affect Neurotransmission?

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# Parent Letter

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Dear Parents,

Next week in biology class, we will investigate the effect of caffeine on the body. Each student will need to bring in a 12-ounce can of \_\_\_\_\_. Please provide one can labeled with your child's name and class period.

During the activity, students will consume 12 ounces of the above specified soft drink and measure what effect it has, if any, on their heart rates.

Students are not to bring in any soft drink other than the one specified. Because the different brands and flavors vary in their caffeine content, it is important that all students consume the same brand.

Students who choose not to bring in a soft drink, or those without signed permission forms, can participate in the activity by drinking 12 ounces of water. They will be an important part of the activity by serving as a "control."

Thank you for your continued support.

Teacher's Signature

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My child, \_\_\_\_\_, has permission to participate in the caffeine activity in class and will bring in a 12-ounce can of \_\_\_\_\_ to consume as part of the activity.

My child, \_\_\_\_\_, has permission to participate in the activity in class and will bring in a 12-ounce can of **caffeine-free** \_\_\_\_\_ to consume as part of the activity.

My child, \_\_\_\_\_, will not drink a 12-ounce soft drink during the activity, but will participate by drinking 12 ounces of water.

Parent's or Guardian's Signature: \_\_\_\_\_

Date: \_\_\_\_\_

# Caffeine: How Does Your Heart Respond?

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## MATERIALS FOR EACH TEAM

- 2 cans of soft drink (caffeinated or caffeine-free)
- 1 watch or classroom clock with a second hand

## PROCEDURE

**Do Steps 1-3 with your teacher.**

1. When your teacher directs you to do so, find your pulse. You can find it most easily by pressing two fingers against the artery in your neck or on the inside of your wrist. Practice counting the beats.
2. When your teacher directs you to start, count the number of beats you feel in 15 seconds. Your teacher will tell you when to stop. Record the number in the data table on the next page.
3. Multiply the number of beats you counted in 15 seconds by four to calculate your resting heart rate in beats per minute.

**Complete the rest of the activity with your partner.**

4. Predict what you think might happen to your heart rate after you drink a caffeinated soft drink? What might happen after drinking a caffeine-free soft drink? Write your predictions here:
5. At the same time as your partner, drink your can of soft drink. Write down the time when you started drinking your soft drink. For best results, try to drink them quickly, taking less than 10 minutes to finish the can. Write the type of soft drink at the top of the data table on the next page.
6. Watch the time. Sit quietly for 5 minutes. You can talk softly with your partner or read, but keep your body still so that you will not change your heart rate due to activity.
7. After 5 minutes, have one partner measure his or her pulse rate for 15 seconds. Record the number of beats in the data table. The other partner should be the timer, saying "Start" and then "Stop" when the 15 second period is over. Now the partners should switch roles.
8. Continue to take pulse rates every 2 minutes until you have measured your heart rate at least 10 times. Record each measurement in the data table.

9. Use the data that you collected to calculate your heart rate in beats per minute.

<b>Data Table</b> <b>Name of Drink: _____ Type: Caffeinated or Caffeine-Free</b>			
<b>Time (Minutes after drinking soft drink)</b>	<b>Heartbeats counted in 15 seconds</b>	<b>Multiply by 4</b>	<b>Heart rate (beats per minute)</b>
0 (resting heart rate)		x 4	
5		x 4	
7		x 4	
9		x 4	
11		x 4	
13		x 4	
15		x 4	
17		x 4	
19		x 4	
21		x 4	
23		x 4	
25		x 4	
27		x 4	
29		x 4	
31		x 4	
33		x 4	
35		x 4	

Difference between resting heart rate and the highest heart rate after drinking the soft drink: \_\_\_\_\_

Number of minutes after finishing the drink when the heart rate reached its peak: \_\_\_\_\_

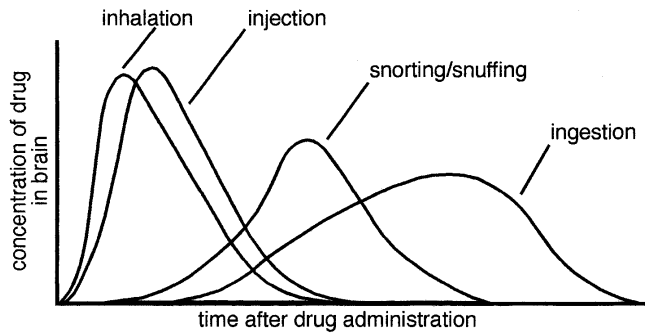
Number of minutes after finishing the drink when the heart rate returned to resting rate: \_\_\_\_\_

Could you drink some amount of caffeinated soft drink without any effect on your heart rate? What would happen if you drank a large amount of caffeinated soft drink? Design an investigation to determine how the amount, or dose, of caffeine affects your heart rate.

# How Do Drugs Get In the Body?

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Use the information in the graph below to help you answer the questions.



1. Four drug abusers each take a drug. One person injects 100 milligrams of a drug into a vein, one person smokes 100 milligrams of the drug, one person snorts 100 milligrams of the drug, and one person swallows or ingests 100 milligrams of the drug. Who will experience the greatest effect of the drug? The individual with the greatest concentration of drug in the brain will have the greatest effect.
2. Who will experience the quickest effect from the drug?
3. Who will experience the least effect from the drug?
4. Who will experience the slowest effect from the drug?
5. Tobacco smokers can use nicotine patches to help them quit smoking. The nicotine patches help the smoker slowly lower the amount of nicotine that enters the body. How does the nicotine in the patch enter the body?
6. Explain why the different ways of taking drugs cause different responses.

## What Should the Doctor Do?

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A teenage boy is brought into the hospital emergency room after a skateboarding accident. He complains of pain in his left leg. The doctor orders an x-ray of his leg, which reveals a fracture in the tibia. Before the doctor can set the fracture and put a cast on the boy's leg, he needs to relieve the patient's pain. The doctor prescribes morphine.

Based upon what you have learned about how drugs act in the body, how should the morphine be given to the patient? Should the morphine be given as a(n):

- pill
- shot
- inhalant

Consider each alternative and explain why the doctor should choose one method over another.